

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-159758

(43)Date of publication of application : 25.06.1993

(51)Int.Cl.

H01M 2/08

(21)Application number : 03-317656

(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 02.12.1991

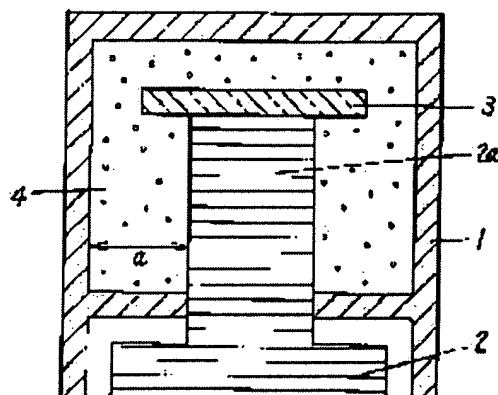
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JINBO HIROYUKI

## (54) MANUFACTURE OF SEALED LEAD-ACID BATTERY

## (57)Abstract:

**PURPOSE:** To provide a method for manufacturing a sealed lead-acid battery such as filling the periphery of a pole pillar sufficiently with a filler with no influence by viscosity of resin, peripheral temperature and humidity even when dimension of the periphery of the pole pillar of the battery is designed small, in the sealed lead-acid battery of type for sealing a pole pillar part, connected to a plate, with the filler of thermosetting resin.

**CONSTITUTION:** In a method for manufacturing a sealed lead-acid battery, in the case of sealing a part of a pole filler 2a, connected to a plate 2, with a filler 4 of quality such as viscosity 10Pa. s or more or a gel time 20 minutes or less difficult for the periphery of the pole pillar 20a sufficiently filled with the filler 4, the part of the pole pillar 2a is preheated before injecting the filler. In this way, the periphery of the pole pillar 2a is sufficiently filled with the filler.



## LEGAL STATUS

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[Kind of final disposal of application other than the  
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registration]

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CLAIMS

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[Claim(s)]

[Claim 1] The manufacturing method of the sealing form lead accumulator which obturates said pole pillar part which more than 10Pa.s or the gelation time was the sealing form lead accumulator of the structure where viscosity obturates the pole pillar part connected to the plate at 25 degrees C, the thermosetting resin, i.e., the bulking agent, which is 20 or less minutes at 25 degrees C, and heated said pole pillar part beforehand and raised temperature before pouring in said bulking agent with said bulking agent.

[Claim 2] The manufacturing method of the sealing form lead accumulator according to claim 1 which raises the temperature of a pole pillar part to 40 degrees C - 100 degrees C temporarily by heating a pole pillar part before pouring in a bulking agent.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the manufacturing method of the sealing form lead accumulator used for the power source of a noncommercial porter pull device etc. about the manufacturing method of a sealing form lead accumulator.

[0002]

[Description of the Prior Art] Many of sealing form lead accumulators are maintaining the seal nature of the pole pillar part which is a part which takes out the electrical and electric equipment from the interior of a cell by filling up a perimeter with a bulking agent. When the part which air bubbles etc. remain to the perimeter of a pole pillar, and is not filled up into it with a bulking agent exists, the obturation nature of a pole pillar part with the large part with which it does not fill up falls. Viscosity used the low long resin of the gelation time for the bulking agent so that it might harden, after the perimeter of a pole pillar was fully conventionally filled up with the thermosetting resin which is a bulking agent.

[0003]

[Problem(s) to be Solved by the Invention] However, in the conventional manufacturing method, viscosity is low, the gelation time was long, i.e., the condition that viscosity was low could adopt only long resin as a bulking agent before hardening, but not only the dependability of a pole pillar part but the ease of making on manufacture had to be enough taken into consideration, and had to choose the class of bulking agent. Moreover, since the viscosity of a bulking agent became high depending on surrounding temperature and humidity or moisture adhered to a pole pillar part, there was also a fault that the wettability to the case of the pole pillar of a bulking agent and a pole pillar part fell. Furthermore, in the design of a lead accumulator, dimension sufficient between a pole pillar and a pole pillar partial case needed to be secured so that air bubbles might not remain in the perimeter of a pole pillar. About a bulking agent with low viscosity, when the raw material of low molecular weight was used, cost was high, and when it diluted with a diluent too much, there was also a problem that bond strength and sulfuric-acid-proof nature fell.

[0004] This invention solves the above-mentioned conventional trouble, the width of face of selection of a bulking agent class is expanded, and effect of surrounding temperature and humidity is not received, but it aims at offering the manufacturing method of the sealing form lead accumulator which can make smaller the dimension between a pole pillar and a pole pillar partial case.

[0005]

[Means for Solving the Problem] More than 10Pa.s or the gelation time is the sealing form lead accumulator of the structure where of viscosity obturates the pole pillar part connected to the plate at 25 degrees C, the thermosetting resin, i.e., the bulking agent, which is 20 or less minutes at 25 degrees C, and in order to solve this technical problem, the manufacture approach of the sealing form lead accumulator by this invention carries out blockade opening of the pole pillar part which heated the pole pillar part beforehand and raised temperature with a bulking agent, before pouring in a bulking agent.

[0006]

[Function] Since it is maintained by the manufacturing method of this sealing form lead accumulator while the temperature of a bulking agent has been high even if a bulking agent contacts the pole pillar section at the time of bulking agent impregnation, it becomes possible to raise the wettability of a bulking agent and a pole pillar part, and air bubbles etc. stop being able to remain easily. Moreover, in order to evaporate the excess water adhering to a pole pillar and a pole pillar partial case, the wettability over the bulking agent by the side of adherend also improves. Therefore, since restoration of a pole pillar part can be performed without air bubbles etc. remaining to the perimeter of a pole pillar even if viscosity is high or the gelation

time uses a short bulking agent, the width of face of selection of a bulking agent becomes large. It becomes unnecessary therefore, to be able to choose a bulking agent class as a subject only for dependability, for low-cost-izing to be possible, to make [ many ] the addition of a diluent, and to reduce bond strength and sulfuric-acid-proof nature. Moreover, offer of the cell of pile structure of a bulking agent with the small dimension between a pole pillar and a pole pillar partial case is also attained around. [0007]

[Example] Hereafter, the manufacturing method of the sealing form lead accumulator of one example of this invention is explained using a drawing.

[0008] Resin a, Resin b, and Resin c were used for the perimeter of pole pillar 2a connected to the plate 2 of the cell of structure as shown in drawing 1 as a bulking agent 4, and it made 2000 cels at a time as an experiment. Viscosity is [ 4.3Pa.s and the gelation time of Resin a ] 15 minutes at 25 degrees C in 25 degrees C. Viscosity is [ 15Pa.s and the gelation time of Resin b ] 30 minutes at 25 degrees C in 25 degrees C. Viscosity is [ 3.5Pa.s and the gelation time of Resin c ] 40 minutes at 25 degrees C in 25 degrees C. Polypropylene with a thickness of 2.0mm was used as an ingredient of the sheathing object of a cell, and the pole pillar partial case 1. 3 is a part for the connection of a terminal and a pole pillar. The cell of drawing 1 set die-length a between the pole pillar partial case 1 and pole pillar 2a to 1.0mm. About each resin, 100 cels left the cell for 30 minutes before bulking agent impregnation in 30, 40, 50, 60, 70, and 80 or 90,100,120-degree-C ambient atmosphere, respectively, and poured in the bulking agent 4 within 30 seconds after ejection. The bulking agent 4 kept it warm at 40 degrees C. Among these resin, conventionally, since viscosity is high, Resin b is resin which canceled adoption. About the 100 remaining cels, the cell was made as an experiment by the conventional approach. The cell made as an experiment deleted 30 cels of cross sections at a time, and calculated the percent defective by making into a defect that to which air bubbles 5 touch pole pillar 2a. An example to which air bubbles touch pole pillar 2a is shown in drawing 2 . About the 70 remaining cels, the heat shock trial was in the electrolytic solution of a pole pillar part operation and one month after, and existence of the liquid spill by stage fright was checked. The result of a cellular percent defective, the liquid-spill incidence rate after a heat shock trial, and the temperature of the pole pillar partial case 1 at the time of bulking agent impregnation is shown in a table 1. Although a heat shock trial differs from a real service condition, it is effective in performing the ratio of a result as an accelerated test.

[0009]

[A table 1]

加熱温度	充填剤注入時 電池温度	加熱後外観	気泡不良率			ヒートショック試験後の 液漏れ		
			樹脂a	樹脂b	樹脂c	樹脂a	樹脂b	樹脂c
加熱なし	20～25℃	問題なし	4/30	9/30	2/30	1/70	2/70	3/70
30℃	25～27℃	問題なし	2/30	5/30	1/30	1/70	1/70	3/70
40℃	33～35℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
50℃	40～44℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
60℃	47～51℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
70℃	53～55℃	問題なし	0/30	0/30	0/30	0/70	0/70	1/70
80℃	61～65℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
90℃	70～75℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
100℃	79～83℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
120℃	93～98℃	ケース影 2/300	0/30	0/30	0/30	0/70	0/70	0/70

[0010] According to the result of a table 1, in the case of 30 degrees C or less, a cellular residual is seen whenever [ stoving temperature / of each resin ]. Only in the case of 30 degrees C or less, in Resin a and Resin b, a liquid spill is seen after a heat shock trial whenever [ stoving temperature ]. All five cells was [ the cellular residual of the pole pillar section of these cells ] the causes. In Resin c, the liquid spill of a cause did not have air bubbles. Moreover, when heating exceeding 100 degrees C was performed, deformation of a resin case was seen.

[0011] Even if it used the bulking agent with high viscosity, and the short bulking agent of the gelation time by heating a pole pillar part beforehand before impregnation of a bulking agent by the above result also in a fuel cell subsystem with the small dimension between the pole pillars and the pole pillar partial cases 1 where many air bubbles remain by the conventional approach, the cell by which air bubbles do not remain around a pole pillar was able to be made. Therefore, it has checked that the width of face of selection of a bulking agent could obtain breadth and a cell with the more high obturation dependability of a pole pillar part. However, since the temperature of resin which can be heated changes with the class and grade of the resin of a case ingredient, it needs to be careful of whenever [ stoving temperature ] enough, and a fuel cell subsystem needs to determine it.

[0012]

[Effect of the Invention] Since it is maintained while the temperature of a bulking agent has been high even if the bulking agent at the time of bulking agent impregnation contacts the pole pillar section by explanation of the above example according to the manufacturing method of the sealing form lead accumulator of this invention so that clearly, viscosity becomes possible [ injecting a bulking agent into a pole pillar part in the low condition ], and since the wettability of a pole pillar and a bulking agent improves, \*\*\*\*\* etc. stops being able to remain easily. Moreover, in order to evaporate the excess water adhering to a pole pillar and a pole pillar partial case, the wettability over the bulking agent by the side of adherend also improves. Since restoration of a pole pillar part can be performed without air bubbles etc. remaining to the perimeter of a pole pillar even if viscosity is high or the gelation time uses a short bulking agent, it becomes unnecessary therefore, to attain breadth and low cost-ization of the width of face of selection of a bulking agent, and to make [ many ] a diluent addition, and to reduce bond strength and sulfuric-acid-proof nature. Moreover, offer of the cell of pile structure of a bulking agent with the small

dimension between a pole pillar and a pole pillar partial case is also attained around.

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TECHNICAL FIELD

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[Industrial Application] Especially this invention relates to the manufacturing method of the sealing form lead accumulator used for the power source of a noncommercial porter pull device etc. about the manufacturing method of a sealing form lead accumulator.

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PRIOR ART

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[Description of the Prior Art] Many of sealing form lead accumulators are maintaining the seal nature of the pole pillar part which is a part which takes out the electrical and electric equipment from the interior of a cell by filling up a perimeter with a bulking agent. When the part which air bubbles etc. remain to the perimeter of a pole pillar, and is not filled up into it with a bulking agent exists, the obturation nature of a pole pillar part with the large part with which it does not fill up falls. Viscosity used the low long resin of the gelation time for the bulking agent so that it might harden, after the perimeter of a pole pillar was fully conventionally filled up with the thermosetting resin which is a bulking agent.

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EFFECT OF THE INVENTION

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[Effect of the Invention] Since it is maintained while the temperature of a bulking agent has been high even if the bulking agent at the time of bulking agent impregnation contacts the pole pillar section by explanation of the above example according to the manufacturing method of the sealing form lead accumulator of this invention so that clearly, viscosity becomes possible [ injecting a bulking agent into a pole pillar part in the low condition ], and since the wettability of a pole pillar and a bulking agent improves, \*\*\*\*\* etc. stops being able to remain easily. Moreover, in order to evaporate the excess water adhering to a pole pillar and a pole pillar partial case, the wettability over the bulking agent by the side of adherend also improves. Since restoration of a pole pillar part can be performed without air bubbles etc. remaining to the perimeter of a pole pillar even if viscosity is high or the gelation time uses a short bulking agent, it becomes unnecessary therefore, to attain breadth and low cost-ization of the width of face of selection of a bulking agent, and to make [ many ] a diluent addition, and to reduce bond strength and sulfuric-acid-proof nature. Moreover, offer of the cell of pile structure of a bulking agent with the small dimension between a pole pillar and a pole pillar partial case is also attained around.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, in the conventional manufacturing method, viscosity is low, the gelation time was long, i.e., the condition that viscosity was low could adopt only long resin as a bulking agent before hardening, but not only the dependability of a pole pillar part but the ease of making on manufacture had to be enough taken into consideration, and had to choose the class of bulking agent. Moreover, since the viscosity of a bulking agent became high depending on surrounding temperature and humidity or moisture adhered to a pole pillar part, there was also a fault that the wettability to the case of the pole pillar of a bulking agent and a pole pillar part fell. Furthermore, in the design of a lead accumulator, dimension sufficient between a pole pillar and a pole pillar partial case needed to be secured so that air bubbles might not remain in the perimeter of a pole pillar. About a bulking agent with low viscosity, when the raw material of low molecular weight was used, cost was high, and when it diluted with a diluent too much, there was also a problem that bond strength and sulfuric-acid-proof nature fell.

[0004] This invention solves the above-mentioned conventional trouble, the width of face of selection of a bulking agent class is expanded, and effect of surrounding temperature and humidity is not received, but it aims at offering the manufacturing method of the sealing form lead accumulator which can make smaller the dimension between a pole pillar and a pole pillar partial case.

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MEANS

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[Means for Solving the Problem] More than 10Pa.s or the gelation time is the sealing form lead accumulator of the structure where of viscosity obturates the pole pillar part connected to the plate at 25 degrees C, the thermosetting resin, i.e., the bulking agent, which is 20 or less minutes at 25 degrees C, and in order to solve this technical problem, the manufacture approach of the sealing form lead accumulator by this invention carries out blockade opening of the pole pillar part which heated the pole pillar part beforehand and raised temperature with a bulking agent, before pouring in a bulking agent.

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OPERATION

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[Function] Since it is maintained by the manufacturing method of this sealing form lead accumulator while the temperature of a bulking agent has been high even if a bulking agent contacts the pole pillar section at the time of bulking agent impregnation, it becomes possible to raise the wettability of a bulking agent and a pole pillar part, and air bubbles etc. stop being able to remain easily. Moreover, in order to evaporate the excess water adhering to a pole pillar and a pole pillar partial case, the wettability over the bulking agent by the side of adherend also improves. Therefore, since restoration of a pole pillar part can be performed without air bubbles etc. remaining to the perimeter of a pole pillar even if viscosity is high or the gelation time uses a short bulking agent, the width of face of selection of a bulking agent becomes large. It becomes unnecessary therefore, to be able to choose a bulking agent class as a subject only for dependability, for low-cost-izing to be possible, to make [ many ] the addition of a diluent, and to reduce bond strength and sulfuric-acid-proof nature. Moreover, offer of the cell of pile structure of a bulking agent with the small dimension between a pole pillar and a pole pillar partial case is also attained around.

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EXAMPLE

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[0009]

[A table 1]

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40℃	33～35℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
50℃	40～44℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
60℃	47～51℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
70℃	53～55℃	問題なし	0/30	0/30	0/30	0/70	0/70	1/70
80℃	61～65℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
90℃	70～75℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
100℃	79～83℃	問題なし	0/30	0/30	0/30	0/70	0/70	0/70
120℃	93～98℃	ケース変形 2/300	0/30	0/30	0/30	0/70	0/70	0/70

[0010] According to the result of a table 1, in the case of 30 degrees C or less, a cellular residual is seen whenever [ stoving temperature / of each resin ]. Only in the case of 30 degrees C or less, in Resin a and Resin b, a liquid spill is seen after a heat shock trial whenever [ stoving temperature ]. All five cells was [ the cellular residual of the pole pillar section of these cells ] the causes. In Resin c, the liquid spill of a cause did not have air bubbles. Moreover, when heating exceeding 100 degrees C was performed, deformation of a resin case was seen.

[0011] Even if it used the bulking agent with high viscosity, and the short bulking agent of the gelation time by heating a pole pillar part beforehand before impregnation of a bulking agent by the above result also in a fuel cell subsystem with the small dimension between the pole pillars and the pole pillar partial cases 1 where many air bubbles remain by the conventional approach, the cell by which air bubbles do not remain around a pole pillar was able to be made. Therefore, it has checked that the width of face of selection of a bulking agent could obtain breadth and a cell with the more high obturation dependability of a pole pillar part. However, since the temperature of resin which can be heated changes with the class and grade of the resin of a case ingredient, it needs to be careful of whenever [ stoving temperature ] enough, and a fuel cell subsystem needs to determine it.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The sectional view near the pole pillar part of the cell in the manufacturing method of the sealing form lead accumulator of one example of this invention

[Drawing 2] The sectional view near the pole pillar part of the cell in which an example to which air bubbles touch the pole pillar in the manufacturing method of the conventional sealing form lead accumulator is shown

[Description of Notations]

- 1 Pole Pillar Partial Case
- 2 Plate
- 2a Pole pillar
- 4 Bulking Agent
- 5 Air Bubbles

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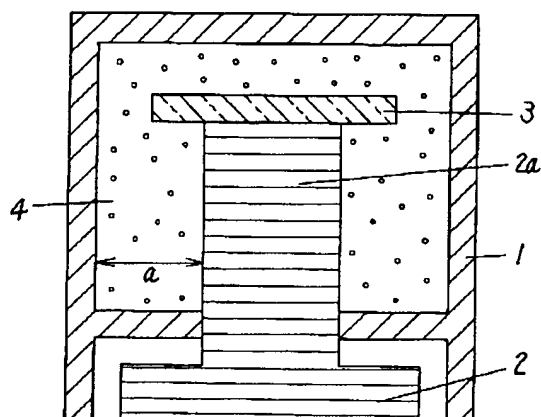
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## DRAWINGS

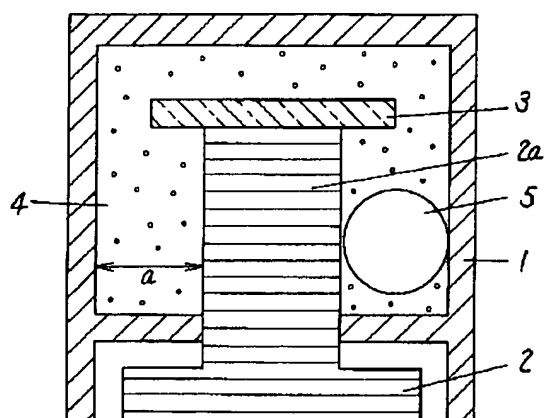
[Drawing 1]

- 1 極柱部分ケース
- 2 極板
- 2a 極柱
- 4 充填剤



[Drawing 2]

5 気泡



[Translation done.]